

Missouri Department of Natural Resources

Total Maximum Daily Load Information Sheet

Gabriel Creek

Waterbody Segment at a Glance:

County: Morgan
Nearby Cities: Stover
Length of impairment: 1 mile
Pollutant: Biochemical Oxygen Demand (BOD),
Non-Filterable Residue (NFR)
Source: Stover Wastewater Treatment Plants (WWTPs)



State map showing location of watershed

Note: Sampling subsequent to the development of the 2002 303(d) List also indicates that Ammonia should be added as a pollutant to this stream.

TMDL Priority Ranking: High

Description of the Problem

Beneficial uses of Gabriel Creek

- Livestock and Wildlife Watering
- Protection of Warm Water Aquatic Life
- Protection of Human Health associated with Fish Consumption

Use that is impaired

- Protection of Warm Water Aquatic Life

Standards that apply

- The Missouri Water Quality Standard, found in 10 CSR 20-7.031 Table A, for dissolved oxygen (related to BOD) in streams is 5.0 mg/L (milligrams per liter or parts per million).
- Standards for Non-Filterable Residue (NFR) may be found in the general criteria section of the WQS, 10 CSR 20-7.031(3)(A) and (C) where it states:
 - Waters shall be free from substances in sufficient amounts to cause the formation of putrescent, unsightly or harmful bottom deposits or prevent full maintenance of beneficial uses.
 - Waters shall be free from substances in sufficient amounts to cause unsightly color or turbidity, offensive odor or prevent full maintenance of beneficial uses.

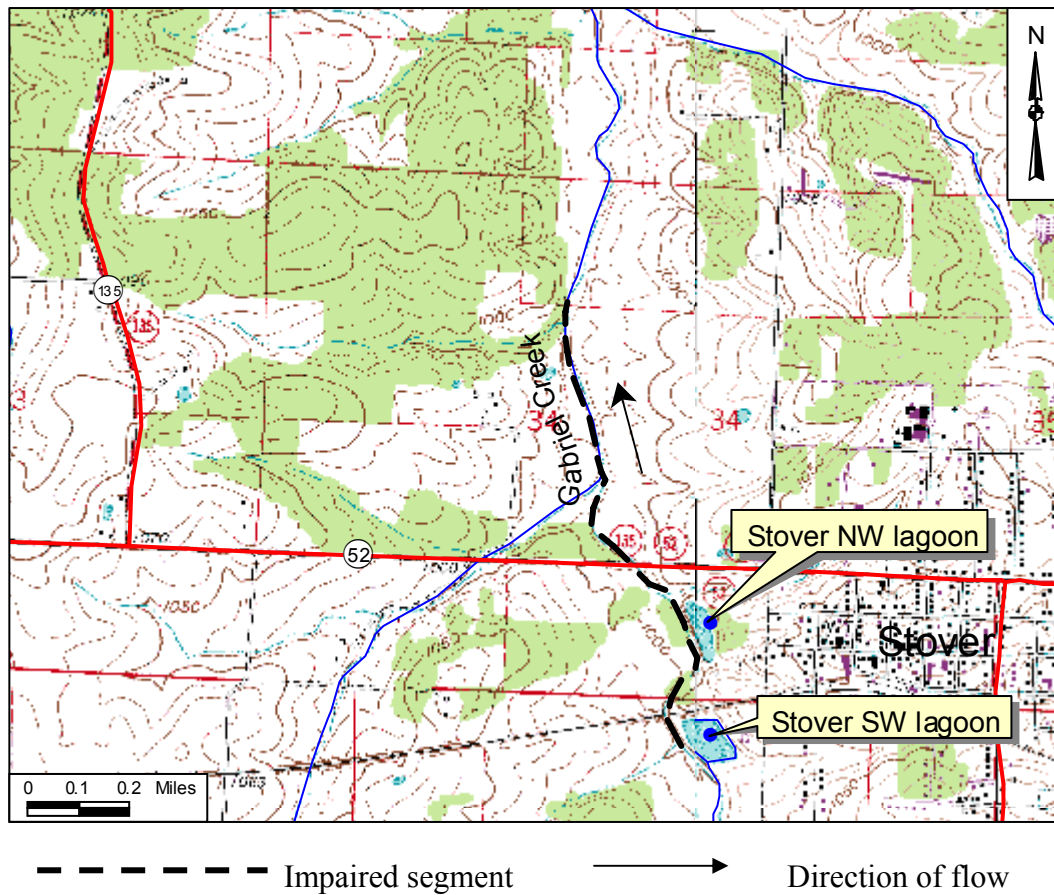
- Ammonia (NH₃-N) standards vary depending on the pH and the temperature. Ammonia limits for a General Warm Water Fishery (at a pH of 7.8) are 1.2 mg/L for summer and 2.1 mg/L during the winter. The ammonia tables are found at 10 CSR 20-7.031 Table B.

Background Information and Water Quality Data

This stream shows reduced diversity of aquatic invertebrates (water insects and crayfish) and low levels of dissolved oxygen downstream from the two Stover wastewater treatment plant (WWTP) lagoons. Many aquatic organisms require high levels of oxygen to survive and wastewater that is high in BOD (Biochemical Oxygen Demand) lowers the dissolved oxygen in a stream. For this reason, one mile of Gabriel Creek was placed on the 303(d) list. Since that listing, elevated levels of instream ammonia have been found downstream of the lagoons. Ammonia in sufficient amounts can be toxic to aquatic life and also lowers dissolved oxygen in the stream. The department will request that ammonia be added to the 303(d) list in the next listing cycle. At the same time, the department will request that Non-Filterable Residue be removed as a pollutant, since the data do not support its listing. A summary of water quality data collected in 2002 and 2003 is given in the table below. Bold numbers exceed state water quality standards.

Mean Water Quality Data for Gabriel Creek, for Two Water Quality Studies 2002 and 2003						
Site	Flow (cfs)	A.M. Water Temp. (C)	A.M. Diss. Oxygen (mg/L)	Ammonia (mg/L)	Total Susp- ended Solids (mg/L)	Volatile Suspended Solids (mg/L)
Gabriel Cr. 0.1 mi. upstream of Stover S Lgn.	0.0	19	2.2	<0.03		
Stover South Lagoon effluent	0.10	22.5	2.2	4.36	100	86
Stover North Lagoon effluent	0.18	23	<1	10.77	72	51
Gabriel Cr. 0.1 mi. downstrm of Stover N Lgn	0.25	19	1.4	5.83	5	<5
Gabriel Cr. 1.3 mi. downstrm of Stover N Lgn	0.25	19.5	1.6	0.27	8	5
Gabriel Cr. 2.0 mi. downstrm of Stover N Lgn	0.10	17		<0.03	8	<5

Gabriel Creek and the Stover Lagoons in Morgan County, Missouri



For more information call or write:

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